

**CLAIMS:**

1. A packaging material which comprises:

a polymeric base component; and

5 a barrier component which coats and lines a surface of the base component,

the barrier component inhibiting migration of gases, vapours and liquids through the base component, and the barrier component being

characterised in that

10 it comprises a polymeric layer which coats and lines the surface of the base component, the polymeric layer comprising at least two different polymeric species which are polar and which are water soluble, the different species having different chemical compositions and being complementary in that they are bound together physically by interpolymer complexation to form an interpenetrating physical network  
15 which provides the barrier component.

2. A packaging material as claimed in Claim 1, characterised in that it is in the form of a package or container.

20 3. A packaging material as claimed in Claim 2, characterised in that the package or container is selected from the group consisting of capsules, blister packages, sachets, envelopes, jerry cans, bottles and jars.

4. A packing material as claimed in Claim 2 or Claim 3, characterised in that it has an inner surface which is coated and lined by the barrier component.

5. A packaging material as claimed in any one of Claims 2 – 4 inclusive, characterised in that it has an outer surface which is coated and lined by the barrier component.

6. A packaging material as claimed in any one of Claims 1 – 5 inclusive, characterised in that the barrier component adheres to the base component physically by electrostatic bonding.

7. A packaging material as claimed in any one of Claims 1 – 6 inclusive, characterised in that the barrier component adheres to the base component chemically by covalent bonding.

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8. A packaging material as claimed in any one of Claims 1 – 7 inclusive, characterised in that each barrier component has a surface remote from the base component and having a protective coating thereon, on the opposite side of the barrier component from the base component.

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9. A packaging material as claimed in Claim 8, characterised in that the material of the protective coating is of a material selected from the group consisting of thermosetting polymers, ultraviolet-curable polymers and thermoplastic polymers.

10. A packaging material as claimed in Claim 9, characterised in that the material of the protective coating is selected from the group consisting of the polymeric material of the base component, polyurethanes, urethane acrylates, polyvinylidene chlorides, polyacrylates, polyepoxides, polydimethyl siloxanes and copolymers of any  
5 two or more thereof.

11. A packaging material as claimed in any one of Claims 1 – 10 inclusive, characterised in that it is in the form of a bottle for use in the bottling of carbonated drinks or beverages, there being a single barrier component which is located on the  
10 outer surface of the bottle, the base component comprising a polymeric plastics material selected from the group consisting of polyethylene terephthalates, polyethylene terephthalate glycols, polycarbonates, polystyrenes, polyamides, polybutylene terephthalates, polyethelene naphthalates, polyacrylonitriles, polymethyl pentenes, polyvinyl chlorides, polyethylenes, polypropylenes, polybutylenes and  
15 copolymers of any two or more thereof.

12. A packaging material as claimed in any one of Claims 1 – 11 inclusive, characterised in that the complementary species of the barrier component are selected from the group consisting of polyvinyl alcohols, polyvinyl amines, polyvinyl imines,  
20 polyvinyl acetates, polyglycols, polyacrylic acids, polyalkylacrylic acids, polyacrylamides, polyalkyl acrylamides, polyvinyl pyrrolidones, polylactides, polyanhydrides, polyamides, celluloses, pectins, proteins, gums, hydroxymethyl celluloses, carboxymethyl celluloses, hydroxyethyl starches, carboxymethyl starches,

cellulose acetates, cellulose acetate butyrates, cellulose acetate propionates and copolymers of any two or more thereof.

13. A packaging material as claimed in any one of Claims 1-11 inclusive, in which

5 the complementary species of the barrier component are selected from polyvinyl alcohols and polymethyl vinyl ether/ maleic acid copolymers.

14. A packaging material as claimed in any one of Claims 1 – 13 inclusive,

characterised in that the complementary species of the barrier component each have

10 a molecular mass in the range 4 000 – 100 000 g/mol, the major proportion of the molecules thereof having molecular masses falling within this range.

15. A packaging material as claimed in Claim 14, characterised in that the

molecular mass range is 28 000 – 76 000 g/mol.

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16. A packaging material as claimed in any one of Claims 1 – 15 inclusive,

characterised in that the surface of the base component, where it is coated and lined

by the barrier component, is activated by a technique selected from the group

consisting of oxyfluorination, flame treatment, plasma treatment, and combinations of

20 any two or more thereof.

17. A process for producing a packaging material which comprises a polymeric

base component and a barrier component which coats and lines a surface of the

base component, the barrier component inhibiting migration of gases, vapours and liquids through the base component,

the process being characterised in that

it comprises the step of coating at least one surface of the base component with a

5 barrier component in the form of a polymeric layer which comprises at least two complementary polymeric species which are polar and water soluble, and have different chemical compositions, the layer lining the base component and the coating step causing the complementary species to interact together physically by interpolymer complexation to form an interpenetrating physical network which

10 provides the barrier component.

18. A process as claimed in Claim 17, characterised in that it includes the step of shaping the base component into a package or container.

15 19. A process as claimed in Claim 18, characterised in that the coating step takes place after the step of shaping the base component into a package or container.

20. A process as claimed in Claim 18 or Claim 19, characterised in that the coating step takes place on an inner surface of the package or container.

21. A process as claimed in any one of Claims 18 – 20 inclusive, characterised in that the coating takes place on an outer surface of the container.

22. A process as claimed in any one of Claims 17 – 21 inclusive, characterised in that the coating step comprises physically adhering the barrier component to the base component by electrostatic bonding.

5 23. A process as claimed in any one of Claims 17 – 22 inclusive, characterised in that the coating step comprises chemically adhering the barrier component to the base component by covalent bonding.

10 24. A process as claimed in any one of Claims 17 – 23 inclusive, characterised in that it includes the step, after the coating of the base component with each barrier component, of providing a protective coating on the opposite side of each barrier component from the base component, remote from the base component.

15 25. A process as claimed in any one of Claims 17 – 24 inclusive, characterised in that it includes the step of selecting the material of the protective coating from the group consisting of thermosetting polymers, ultraviolet-curable polymers and thermoplastic polymers.

20 26. A process as claimed in any one of Claims 17 – 25 inclusive, characterised in that it includes the step of selecting the material of the protective coating from the group consisting of the polymeric material of the base component, polyurethanes, urethane acrylates, polyvinylidene chlorides, polyacrylates, polyepoxides, polydimethyl siloxanes and copolymers of any two or more thereof.

27. A process as claimed in any one of Claims 17 – 26 inclusive, characterised in that it includes the step of selecting the base component from materials of the group consisting of polyethylene terephthalates, polyethylene terephthalate glycols, polycarbonates, polystyrenes, polyamides, polybutylene terephthalates, polyethelene naphthalates, polyacrylonitriles, polymethyl pentenes, polyvinyl chlorides, polyethylenes, polypropylenes, polybutylenes and copolymers of any two or more thereof.

28. A process as claimed in any one of Claims 17 – 27 inclusive, characterised in

that it includes the step of selecting each of the complementary species of the barrier component from the group consisting of polyvinyl alcohols, polyvinyl amines, polyvinyl imines, polyvinyl acetates, polyglycols, polyacrylic acids, polyalkylacrylic acids, polyacrylamides, polyalkyl acrylamides, polyvinyl pyrrolidones, polylactides, polyanhydrides, polyamides, celluloses, pectins, proteins, gums, hydroxymethyl celluloses, carboxymethyl celluloses, hydroxyethyl starches, carboxymethyl starches, cellulose acetates, cellulose acetate butyrates, cellulose acetate propionate and copolymers of any two or more thereof.

29. A process as claimed in any one of Claims 17-27 inclusive, characterized in that

it includes the step of selecting each of the complementary species of the barrier component from the group consisting of polyvinyl alcohols and polymethyl vinyl ether/maleic acid copolymers.

30. A process as claimed in Claim 28 or Claim 29, characterised in that it includes the step of selecting each of the complementary species of the barrier component to have a molecular mass in the range 4 000 – 100 000 g/mol, the major proportion of the molecules thereof having molecular masses falling within this range.

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31. A process as claimed in Claim 30, characterised in that the molecular mass range is 28 000 – 76 000 g/mol.

32. A process as claimed in any one of Claims 17 - 31 inclusive, characterised in  
10 that it includes the step, prior to the coating of the base component with the barrier component, of activating the surface of the base component.

33. A process as claimed in Claim 32, characterised in that the step of activating the surface of the base component includes physically activating said surface, by  
15 subjecting it to an activation technique selected from roughening or abrading, ultraviolet radiation treatment, gamma radiation treatment, flame treatment, plasma treatment and combinations of two or more thereof.

34. A process as claimed in Claim 32 or Claim 33, characterised in that the step of  
20 activating the surface of the base component includes chemically activating said surface, by subjecting it to an activation technique selected from etching, ozone treatment, fluorine treatment, chlorine treatment, oxidising treatment and combinations of any two or more thereof.

35. A process as claimed in Claim 34, characterised in that the activation step is selected from the step of oxidising by means of a strong oxidising agent selected from potassium peroxidisulphate, azoisobutylnitrite, potassium permanganate, the step of fluorinating, the step of oxyfluorinating and combinations of any two or more said steps.

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36. A process as claimed in any one of Claims 17 – 32 inclusive, characterised in that the coating of the base component surface with the barrier component is by forming a mixture which is a solution of the complementary species of the barrier component in a solvent, coating the base component with the solution, and removing  
10 the solvent from the coating to dry the coating.